IN THE SPECIFICATION

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CLEAN VERSION OF SPECIFICATION

WOODEN FLOOR

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention concerns a wood floor, comprising a hardenable or curable adhesive which is coated as a continuous layer onto a floor base, and covering elements of wood or a wood material that are bonded to the adhesive over their entire surface to be glued.

Description of the Related Art

[0002] For adhering covering elements used to make parquet or inlay floors, adhesives are conventionally employed which are comprised of natural and/or synthetic resins and include suitable solvents and additives. According to applicable DIN (German Industrial Standard) 281, the parquet adhesives exhibit a shear strength of at least 3 to 3.5 N/mm^2, which results in a hard and brittle junction of the covering elements to the base floor. The adhesive is applied using a toothed trowel. When laying the parquet floor, attention must be paid to the fact that the parquet wood expands when absorbing moisture and shrinks when (re)drying. The parquet wood conventionally contains 9% water during the laying process. The moisture content can change due to water uptake in a new construction through the sub-floor, or from the environment, or as a result of the variable humidity depending upon the season. The expansion and shrinking caused thereby must be absorbed or accepted by the adhesive material. Thereby, substantial shear forces result. These shear forces can in certain cases result in a bowing out of the parquet wood or result in gaps or

formation of splits. In the case of breakage it frequently occurs that not only the adhesive joint but rather also the sub-floor comprised of cement is damaged. This is due to the fact that the shear strength of the cement floor is relatively low in comparison to the parquet adhesive according to DIN 281. On the other hand, during drying the parquet pieces shrink. Since the parquet adhesive does not permit a shrinking at the point of adhesion, frequently large gaps occur between the parquet pieces.

SUMMARY OF THE INVENTION

[0003] Beginning therewith, it is the task of the invention to develop a floor which can transmit the shear forces, resulting from expansion due to absorption of moisture and contraction due to drying back again, from the wood parquet elements to the sub-floor without separation of the adhesive bond and bowing out of the floor covering.

[0004] For the solution of this task, there is proposed a floor, comprised of a sub-floor continuously covered with a layer of cured adhesive, and covering elements of wood or wood materials completely covered on their surface to be adhered with the adhesive, wherein the adhesive layer has a layer thickness of 0.5 to 5 mm, and wherein the adhesive has a shear strength in the cured condition which is less than that of the sub-floor. Advantageous embodiments and further developments of the invention can be found in the dependent claims.

[0005] The inventive solution is based upon the idea, that the forces occurring during expansion and shrinking of the parquet

elements can only be transmitted to the sub-floor without an impermissible localized accumulation of forces when they are distributed and evenly diffused, within the adhesive layer, over the entire adhesive surface. In order to achieve this, it is proposed in accordance with the invention that the adhesive layer has a thickness of 0.5 to 5 N/mm^2 and that the adhesive in the cured condition exhibits a shear strength which is less than that of the sub-floor. The shear strength of cement floors is an average of approximately 1.2 N/mm^2. In accordance therewith an adhesive is selected, of which the shear strength is less than 1.2 N/mm^2, preferably 0.6 to 1.0 N/mm^2. Preferably, a reaction adhesive is selected which hardens with a Shore Hardness (A) of 20 to 35. Thereby it is achieved that, in the case of expansion or shrinking, the forces occurring at the adhesive layer are evenly distributed over the entire adhesive surface. There are no force or tension peaks, which can lead to a release or to a break in the adhesive connection. The distribution of the forces ensures that the floor covering elements deform less in the case of excessive moisture or in the case of drying out. The covering elements are supported and held over large surface areas, without occurrence of breakage areas in the adhesive. Thereby, a bowing-out of the floor covering wood is avoided. On the other hand, in the case of drying out, the formation of gaps is reduced. Research has shown that the covering elements, in the case of absorbing excessive moisture, becomes somewhat compressed along their contact flanks. As a result of the pressing of wood, minor deformations occur within the wood in the edge area, which however are barely discernable from the outside. In the case of the inventive elastic adhesion, one obtains a substantially even

surface loading or force distribution over the surface area. This means that the greater the adhered surface is, the greater is the force transmission or distribution. Besides this, a bonding is achieved in a way that protects the sub-floor. A substantially elastic joining also results in a substantial reduction in foot-step noise in comparison to the hard adhesives. The surprising benefit of the inventive floor covering adhesion is comprised therein, that despite low shear strength of the employed adhesive, the avoidance of tension peaks makes it possible to achieve a substantially higher force transmission than with the convention rigid DIN adhesives.

[0006] A preferred embodiment of the invention envisions that the adhesive is comprised of a reaction adhesive, preferably a polyurethane or polyurethane hybrid, which hardens upon exposure to water. Alternatively, the adhesive can be comprised of MS-polymers (modified silicones).

[0007] The invention is further concerned with the use of elastic adhesives with a higher breaking elongation, which hardens with a shear strength of less than 1.2 N/mm^2, preferably from 0.6 to 1.0 N/mm^2, for adhering wood floors onto a sub-floor preferably comprised of cement or concrete. The inventive adhesive is preferably applied to the sub-floor using a toothed trowel to a thickness of 0.5 to 5 N/mm^2.

BRIEF DESCRIPTION OF THE DRAWING

[0008] In the following the invention will be explained in greater detail on the basis of the illustrated embodiment represented schematically in the figures. There is shown:

Fig. 1 a section through a wood floor;

Fig. 2 a shearing stress - elongation diagram for DIN-parquet adhesives and an inventive adhesive.

DETAILED DESCRIPTION OF THE INVENTION

[0009] The parquet floor shown in sectional representation in Fig. 1 is comprised of an adhesive **12** applied in a continuous layer onto a sub-floor **10** comprised of cement, and covering elements **16** which are covered over their entire surface to be adhered **14** with the adhesive **12**. The adhesive is preferably comprised of a one component polyurethane which hardens upon exposure to water, which in the cured condition exhibits a shearing strength τ of less than 1.2 N/mm^2. The shear strength τ is a quotient of the highest force F_{max} and the adhesive surface A of the floor-covering adhesive bond:

$$\tau = F_{max}/A$$

In the stress-elongation diagram according to Fig. 2, the stress-elongation curve $\sigma = f(\varepsilon)$ of various adhesives 1 and 2 is shown. The end of the respective curve defines the pull shear strength of the employed adhesive, which in the case of DIN-adhesive 1 is approximately 3.5 N/mm^2 and in the case of the inventive adhesive 2 is approximately 0.7 N/mm^2. As reference value there is shown with dashed line 3 in the diagram the average shear strength value of cement flooring. The inventive

adhesive 2 belongs to the elastic adhesives while the floor covering adhesive 1 according to DIN 281 is non-elastic.

[00010] Experiments have shown that the elastic floor covering adhesive prevents bowing-out of the wood despite the lower shear strength of the adhesive, and this due to the even distribution of tension. The adhesion is shear resistant. Besides this, a material joining of the floor covering to the cement is produced: the shear strength of the proposed elastic adhesives 2 of 0.7 N/mm^2 is significantly lower than the surface rigidity of cement (1.2 N/mm^2). The hardness of the cured adhesive 2 is approximately 20 to 30 Shore (A). Thus, no damage to the cement floor can occur. For this reason, a pre-coating for sealing or strengthening the cement surface is not necessary. In contrast, the rigid DIN-adhesives with their shear strength of 3.5 N/mm^2 are significantly above that of cement. When adhering therewith, tension peaks occur at the edges of the floor covering elements. The forces resulting from the movement of wood are not distributed over the surface. Even an enlargening of the adhesive surface does not result in any improvement. In the case of the elastic adhesion, in comparison, the forces are transmitted or distributed over the entire adhesion surface: no tension peaks are produced. Thereby substantially higher forces can be transmitted with, at the same time, a lower tension exposure of the sub-floor. With the elastic adhesive no displacement occurs between the parquet elements. Besides this, a bowing out of the parquet elements is avoided.

Example

[00011] The general characteristics of the employed parquet adhesives are as follows:

Shore (A)	25-35	
Break Elongation	300 - 1000%	DIN 53 504
Shear Strength	< 1,2 N/mm^2	with reference to DIN 281
Recovery Value	> 70%	

[00012] In summary, the following can be concluded: The invention relates to a wooden floor, comprising of a hardenable adhesive **12** which is painted onto a floor base **10** in a continuous layer, and covering elements **16** of wood or a wood material of which the entire surface (14) to be bonded is adhered to the adhesive layer. According to the invention, the adhesive layer **12** has a thickness of 0.5 to 5 mm and the adhesive **12** has a shear strength, in its cured state, which is les than that of the sub-floor **10** and is at most 1.2 N/mm^2, in order to obtain a floor covering with excellent dimensional stability.